Poker Cards Analysis – May 2025

The Directors
Entain Plc

This is to confirm that iTech Labs has examined the game logs for Poker games for the period **May 01, 2025,** to **May 31, 2025** as recorded by the respective game servers and analyzed the Poker cards for statistical randomness. The results of the analysis are given below.

For details on the gaming sites serviced by the Entain Plc game servers and used in this audit refer to the List.

1. Poker hand types statistics

These calculations were done for Royal Flush, Straight Flush, Four of a Kind, Full House, Flush, Straight, 3 of a Kind, 2 pairs, 1 Pair, High Card.

The Poker hand types analysis involved creating subsets of data and conducting Chi-square tests on each subset.

The null hypothesis for the chi-square test is that the observed frequencies of each type of hand matches the theoretical values for a deck that has been shuffled using a perfect random number generator. The p-values observed in these multiple tests are expected to follow a uniform distribution for the range 0.0 to 1.0.

The analysis performs a KS Test (Kolmogorov-Smirnov test) for uniform distribution on the observed p-values, and the combined p-value result of this test is taken as the final result of the Poker hand types statistics tests.

1.1 Poker hand types statistics for 52 cards deck:

Test No.	DOF	ChiSqr	P-Value
1	9	5.06	0.82926
2	9	8.97	0.43997
3	9	7.89	0.54505
4	9	4.08	0.90628
5	9	6.33	0.70697
6	9	8.69	0.46648
7	9	4.96	0.83750
8	9	6.64	0.67459
9	9	7.97	0.53744
10	9	3.57	0.93742
11	9	8.07	0.52734
12	9	17.04	0.04806
13	9	4.76	0.85459
14	9	8.00	0.53364
15	9	5.17	0.81934
16	9	10.11	0.34187
17	9	10.55	0.30764
18	9	10.17	0.33726
19	9	14.31	0.11184
20	9	8.30	0.50439
21	9	2.81	0.97136
22	9	8.67	0.46803
23	9	11.69	0.23143
24	9	6.54	0.68491
25	9	11.94	0.21649
26	9	7.86	0.54864
27	9	17.57	0.04047

28	9	4.49	0.87653
29	9	4.19	0.89869
30	9	6.20	0.71926
31	9	6.32	0.70788
32	9	20.34	0.01595
33	9	5.53	0.78562
34	9	8.23	0.51098
35	9	20.93	0.01296
36	9	13.72	0.13263
37	9	8.04	0.53045
38	9	15.59	0.07585
39	9	3.76	0.92671
40	9	5.39	0.79863
41	9	2.63	0.97711
42	9	12.47	0.18794
43	9	5.32	0.80558
44	9	12.47	0.18831
45	9	11.64	0.23429
46	9	5.47	0.79110
47	9	15.98	0.06741
48	9	17.44	0.04227
49	9	10.03	0.34799
50	9	19.85	0.01884
51	9	7.36	0.59953
52	9	14.51	0.10516
53	9	4.40	0.88291
54	9	13.51	0.14091
55	9	9.12	0.42630
56	9	6.52	0.68734
57	9	14.65	0.10089
58	9	9.01	0.43681
59	9	7.07	0.63007
60	9	5.66	0.77365
61	9	10.31	0.32578
62	9	8.28	0.50610
63	9	5.44	0.79452
64	9	8.71	0.46480
65	9	18.06	0.03446
66	9	6.83	0.65516
67	9	6.23	0.71665
68	9	9.58	0.38517
69	9	5.51	0.78791
70	9	4.18	0.89913
71	9	9.60	0.38347
72	9	3.41	0.94579
73	9	7.58	0.57653
74	9	7.91	0.54291
75	9	18.03	0.03482
76	9	6.31	0.70803
77	9	6.31	0.70840
78	9	17.58	0.04037
79	9	13.19	0.15409
80	9	4.75	0.85540
81	9	14.11	0.11839
82	9	6.73	0.66541
83	9	11.33	0.25364

84	9	5.19	0.81785
85	9	10.83	0.28730
86	9	9.28	0.41205
87	9	4.37	0.88547
88	9	10.76	0.29271
89	9	8.39	0.49519
90	9	5.99	0.74105
91	9	9.30	0.40984
92	9	10.34	0.32356
93	9	13.63	0.13594
94	9	21.22	0.01170
95	9	6.96	0.64090
96	9	4.50	0.87550
97	9	8.11	0.52323
98	9	3.16	0.95778
99	9	4.19	0.89831
100	9	7.38	0.59806
Combined P-value for all tests (Using KS method)			0.91335

Notes:

1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

2. Poker rank statistics

The Poker rank analysis aims to establish that the rank of the cards in each position was equally distributed in one of the 13 possible ranks (2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K, A) for a 52 card deck.

The Poker rank analysis involved creating subsets of data and conducting Chi-square tests on each subset. The analysis performs a KS Test (Kolmogorov-Smirnov test) for uniform distribution on the observed p-values, and the combined p-value result of this test is taken as the final result of the Ranks statistics tests.

2.1 Poker rank statistics for 52 cards deck:

Test No.	DOF	ChiSqr	P-Value
1	84	68.79	0.88511
2	84	87.03	0.38885
3	84	74.83	0.75280
4	84	70.68	0.84967
5	84	84.92	0.45153
6	84	71.38	0.83533
7	84	89.70	0.31502
8	84	81.55	0.55533
9	84	79.66	0.61372
10	84	76.62	0.70358
11	84	72.74	0.80489
12	84	69.58	0.87099
13	84	66.63	0.91817
14	84	75.37	0.73839
15	84	75.88	0.72444
16	84	72.20	0.81712
17	84	70.12	0.86078
18	84	90.36	0.29804
19	84	74.94	0.74976
20	84	100.39	0.10723
21	84	81.91	0.54416
22	84	86.76	0.39660
23	84	102.77	0.08026
24	84	101.32	0.09601

25	84	82.68	0.52031
26	84	74.49	0.76162
27	84	80.11	0.59987
28	84	73.43	0.78824
29	84	75.57	0.73277
30	84	92.58	0.24463
31	84	70.70	0.84933
32	84	86.89	0.39284
33	84	86.29	0.41046
34	84	76.37	0.71086
35	84	99.11	0.12438
36	84	99.53	0.11854
37	84	92.02	0.25755
38	84	65.81	0.92889
39	84	72.75	0.80449
40	84	90.70	0.28953
41	84	82.34	0.53075
42	84	70.91	0.84516
43	84	101.12	0.09839
44	84	75.53	0.73395
45	84	64.39	0.94495
46	84	53.24	0.99647
47	84	102.33	0.08484
48	84	96.01	0.17447
49	84	79.74	0.61123
50	84	92.73	0.24107
51	84	101.08	0.09882
52	84	79.19	0.62817
53	84	89.76	0.31367
54	84	73.60	0.78416
55	84	92.51	0.24616
56	84	84.44	0.46605
57	84	82.71	0.51927
58	84	60.68	0.97421
59	84	69.85	0.86595
60	84	84.62	0.46048
61	84	69.83	0.86640
62	84	85.82	0.42430
63	84	65.85	0.92839
64	84	96.84	0.15984
65	84	94.94	0.19474
66	84	86.07	0.41679
67	84	66.41	0.92113
68	84	101.45	0.09446
69	84	90.73	0.28870
70	84	83.15	0.50567
71	84	81.36	0.56126
72	84	99.58	0.11790
73	84	92.68	0.24225
74	84	82.47	0.52665
75	84	89.78	0.31308
76	84	85.95	0.42039
77	84	87.63	0.37177
78	84	106.60	0.04863
79	84	100.64	0.10411
80	84	73.90	0.77675

81	84	105.08	0.05961
82	84	94.87	0.19606
83	84	102.57	0.08237
84	84	85.16	0.44413
85	84	108.73	0.03609
86	84	80.26	0.59547
87	84	103.85	0.07004
88	84	77.59	0.67569
89	84	74.42	0.76348
90	84	109.74	0.03121
91	84	70.16	0.86001
92	84	58.24	0.98551
93	84	84.44	0.46595
94	84	85.54	0.43257
95	84	72.11	0.81920
96	84	86.91	0.39226
97	84	96.35	0.16842
98	84	92.07	0.25634
99	84	96.51	0.16555
100	84	83.99	0.47983
Combined P-value for all tests (Using KS method)			0.92123

Notes:

1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

3. Poker suits statistics

The Poker suits analysis aims to verify that that the cards dealt exhibit an equal probability of all 4 suits (Clubs, Diamonds, Hearts and Spades) in all positions.

The Poker suits analysis involved creating subsets of data and conducting Chi-square tests on each subset. The analysis performs a KS Test (Kolmogorov-Smirnov test) for uniform distribution on the observed p-values, and the combined p-value result of this test is taken as the final result of the Suits statistics tests.

3.1 Poker suits statistics for 52 cards deck:

Test No.	Positions	DOF	ChiSqr	P-Value
1	7	21	18.11	0.64211
2	7	21	11.30	0.95652
3	7	21	13.57	0.88747
4	7	21	16.17	0.75991
5	7	21	20.87	0.46717
6	7	21	19.43	0.55744
7	7	21	32.07	0.05758
8	7	21	20.23	0.50681
9	7	21	31.53	0.06533
10	7	21	17.98	0.64999
11	7	21	22.68	0.36154
12	7	21	20.82	0.47026
13	7	21	22.77	0.35629
14	7	21	18.46	0.61992
15	7	21	18.70	0.60414
16	7	21	27.57	0.15269
17	7	21	19.53	0.55124
18	7	21	17.94	0.65267
19	7	21	34.57	0.03147
20	7	21	20.01	0.52062
21	7	21	17.55	0.67741
22	7	21	22.01	0.39872

23	7	21	25.89	0.21073
24	7	21	29.85	0.09497
25	7	21	20.04	0.51883
26	7	21	18.21	0.63559
27	7	21	22.17	0.38980
28	7	21	19.29	0.56680
29	7	21	28.45	0.12773
30	7	21	23.98	0.29401
31	7	21	26.24	0.19743
32	7	21	26.90	0.17423
33	7	21	15.90	0.77520
34	7	21	10.96	0.96357
35	7	21	11.96	0.94066
36	7	21	14.75	0.83506
37	7	21	31.29	0.06903
38	7	21	14.61	0.84214
39	7	21	12.09	0.93703
40	7	21	21.02	0.45762
41	7	21	18.49	0.61767
42	7	21	32.92	0.04716
43	7	21	32.71	0.04951
44	7	21	16.58	0.73625
45	7	21	34.01	0.03612
46	7	21	14.14	0.86368
47	7	21	9.93	0.97979
48	7	21	22.28	0.38345
49	7	21	19.64	0.54433
50	7	21	26.58	0.18505
51	7	21	17.96	0.65154
52	7	21	15.38	0.80325
53	7	21	28.07	0.13816
54	7	21	37.99	0.01291
55	7	21	16.70	0.72908
56	7	21	14.24	0.85926
57	7	21	8.81	0.99062
58	7	21	14.14	0.86369
59	7	21	22.28	0.38372
60	7	21	19.16	0.57507
61	7	21	11.84	0.94389
62	7	21	22.31	0.38157
63	7	21	16.75	0.72618
64	7	21	21.98	0.40078
65	7	21	14.07	0.86663
66	7	21	26.80	0.17764
67	7	21	16.66	0.73162
68	7	21	20.43	0.49428
69	7	21	24.14	0.28654
70	7	21	11.90	0.94216
71	7	21	13.48	0.89094
72	7	21	16.66	0.73129
73	7	21	23.05	0.34132
74	7	21	9.30	0.98667
75	7	21	9.44	0.98528
76	7	21	16.29	0.75296
77	7	21	15.07	0.81945
78	7	21	14.30	0.85634

79	7	21	15.01	0.82246
80	7	21	29.10	0.11165
81	7	21	13.67	0.88329
82	7	21	21.33	0.43868
83	7	21	21.53	0.42680
84	7	21	10.22	0.97598
85	7	21	13.68	0.88288
86	7	21	32.19	0.05606
87	7	21	17.71	0.66706
88	7	21	29.67	0.09885
89	7	21	11.74	0.94645
90	7	21	33.35	0.04249
91	7	21	21.23	0.44479
92	7	21	22.46	0.37370
93	7	21	21.33	0.43903
94	7	21	10.70	0.96826
95	7	21	21.67	0.41875
96	7	21	22.85	0.35209
97	7	21	36.25	0.02050
98	7	21	18.98	0.58637
99	7	21	23.16	0.33553
100	7	21	21.24	0.44434
Combined P-value for all tests (Using KS method)				0.30616

*Not*es:

1) The P-values are observed probabilities from the Chi-Square tests. The last row shows the result of the KS Test performed on the p-values for all Chi-Square tests, where there are sufficient data.

4. Summary of the analysis

4.1 Summary of the analysis of 52 cards deck:

The analysis of 52 cards completes by combining the result of the KS Test performed in the 3 types of analysis (Hand Types, Ranks and Suits) for 52 card decks using the Holm's method and producing a single Combined P -value.

The combined p-value produced using the Holm's method is used as indication for statistical randomness.

Combination of p-values using Holm's Method		
Test	**P-Value**	**P-Adjusted**
Ranks Test	0.93654	1.00000
Suits Test	0.95138	0.91849
Hand Types Test	0.45701	1.00000
Combined P-Value using Holm's Method		0.91849

Notes:

1) The combined p-value of all statistical tests using Holm's Method conducted for 52 card decks is greater than the minimum value of 0.05 which indicates that the randomness of the observed data falls within 95% confidence limits.

The final outcome of the analysis of 52 cards deck indicates that the RNG is working correctly.

4. Conclusion

Analysis of actual data from game logs for 'Hand Types, 'Ranks' and 'Suits' for **52-card decks** indicated statistical randomness. Since there is no data in the case of 36 card deck, this report does not contain the details of 36 card deck.

iTech Labs has done limited sanity checks to verify the integrity of the game logs. iTech Labs also maintains a copy of the game logs for verification purposes. There were a large enough number of game records to give the calculations sufficient statistical power.

We conclude that the Random Number Generator (RNG) is working correctly.

Please click here to see the Original report.

Signed:	**Signed:**
	
Alvin Rizaldi **Chief Executive Officer** **iTech Labs** Date: 20 June 2025	**Divya Bhargava** **Project Manager** **iTech Labs** Date: 20 June 2025

Disclaimer.
While it is not possible to test all possible scenarios in a laboratory environment, iTech Labs has conducted a level of testing appropriate for a component test of this type.